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DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Dispensing Closure

We, SIDNEY MORTON LIBIT, of 441 Lakeside Terrace, Glencoe, Illinois, United States of America, and ARTHUR WESLEY NEWBY, of 1265 Schaumburg Road, Elgin, Illinois, United States of America, both citizens of the United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to dispensing closures for receptacles containing fluent material which, for conciseness in the description and claims, is sometimes referred to as a dispensing-closure device. More particularly the invention has reference to a combined dispensing spout and valve, preferably of one-piece construction, capable of occupying two principal positions: one, in which a resilient nozzle is in a position to pour or dispense the contents of the receptacle, i.e. "on", and the other in which the nozzle is bent upon itself on a line intermediate its length, to pinch-shut the bore of the nozzle, which is there retained, i.e. "off", until released for subsequent use.

According to the invention there is provided a dispensing closure for a receptacle for fluid comprising a body, a resilient nozzle with a bore protruding from the body and having an inner end communicating with the receptacle and a tip for discharging the fluid, the nozzle being bendable at a medial portion to close the bore, means to render the inner end of the nozzle more rigid than the medial portion, and a releasable latch for maintaining the nozzle in a bent (off) position and permitting the nozzle to regain an open bore (on) portion upon release from the latch, the construction of the closure being such as to ensure that upon repeated operation of the nozzle between "on" and "off" positions, substantially the same line of bending is preserved.

The invention in one aspect conveniently comprehends a device as aforesaid in which a resilient nozzle, while in the "off" position is restrained by force applied in two directions, one of which is applied substantially in the direction of the axis of the bent-over portion of the nozzle and the other of which is applied substantially transversely to the said axis whereby maximum utilization of the pinching action is realised. In another aspect a force applied predominantly transversely to said axis is thus relied upon.

Another desirable feature of the invention is to provide a device as aforesaid in which the size and shape of the bore of the resilient nozzle to its outer surface are so arranged that the strains of tension and compression developed in the wall of the nozzle are also utilized in obtaining reliable, leak-proof pinching shut of the nozzle.

Conveniently the device as aforesaid may be molded with the nozzle in a position lending itself to automatic handling in a machine wherein the nozzle may be suitably manipulated and placed in an initial "off" position in order that the device may be expeditiously attached to the receptacle by automatic machinery of a standard type. Thus, following filling of the receptacle the closure may be incorporated therewith and the goods immediately packed. However, if desired, the nozzle may, following molding, remain "open" and filling be accomplished through the bore thereof accompanied by suitable venting of air.

Desirably the device as aforesaid includes a base having an upper face adapted to receive an abutting plunger for forcing the devices into operative relation with receptacles having either a beaded neck or a punched hole in one wall, in each of which cases the base is provided with a skirt or a male por-

[Pric

tion respectively as will be pointed out; or the base, where intended for attachment to the screw-threaded neck of a receptacle, is provided with a peripheral portion for engagement by a rotating clutch of the assembly equipment. In any of said cases non-interference of the pertinent parts of the assembling equipment with the nozzle is easily arranged.

Conveniently also the device as aforesaid may be readily adapted to dispensing of fluids in an atomized spray with no alteration in the fundamental features or function of the valve.

It is also convenient to provide, in a modified form of the device, means for stoppering the exit of the nozzle to guard against clogging of the exit end thereof and/or contamination of the contents of the receptacle by foreign matter.

Other features and advantages of the invention will become apparent from the ensuing description which, taken with the accompanying drawings, disclose various forms which the invention may assume in practice.

In these drawings.

Fig. 1 is a side elevational view of a device embodying the principles of the invention shown in "off" position;

Fig. 2 is a view similar to that of Fig. 1 but showing the device as stripped from the mold;

Fig. 3 is a vertical, medial cross section of the device of Fig. 1 showing the same in "off" position;

Fig. 4 is a view similar to that of Fig. 3 but showing the device as reconstituted following molding and in "on" position;

Fig. 5 is an elevational view taken in the direction of the arrows 5—5 in Fig. 1;

Fig. 6 is a top plan view of the device in the "off" position of Fig. 1;

Fig. 7 is a top plan view of the device in the "on" position of Fig. 4;

Fig. 8 is an elevational view taken in the direction of the arrows 8—8 in Fig. 4;

Fig. 9 is a partial cross section taken along the line 9—9 of Fig. 7;

Fig. 10 is a vertical medial cross section of a preferred form of nozzle;

Fig. 11 is a transverse cross section of the nozzle shown in Fig. 10 taken on the line 11—11;

Fig. 12 is a vertical medial cross section of an alternative form of nozzle;

Fig. 13 is a cross section taken on the line 13—13 of Fig. 12;

Fig. 14 is a combined side-elevational view and cross section of another embodiment of the invention;

Fig. 15 is a partial end elevational view of the device taken in the direction of the arrows 15—15 in Fig. 14;

Fig. 16 is a combined side elevational view and cross section of another embodiment, shown "on";

Fig. 17 is a view of the device of Fig. 16, shown "off";

Fig. 17a is a view, similar to Fig. 17, of a modified form of the embodiment of Figs. 16 and 17;

Fig. 18 is a partial cross section taken on the line 18—18 of Fig. 17;

Fig. 19 is a partial view to illustrate an alternative mode of releasably maintaining the nozzle in "off" condition;

Fig. 20 is an end elevation of the features shown in Fig. 19;

Fig. 21 is a partial view to illustrate a modification of Fig. 19, further characterized by means for stoppering the exit of the nozzle;

Fig. 22 is an end elevation of the modification of Fig. 21;

Fig. 23 is a partial view to show still another alternative construction for releasably maintaining the nozzle in "off" condition and additionally closing the bore thereof;

Fig. 24 is a cross section taken on the line 24—24 of Fig. 23;

Fig. 25 illustrates, in elevation, an alternative form of nozzle for spray dispensing; and

Fig. 26 is a top plan view of the nozzle of Fig. 25.

In the following description and claims, where reference is sometimes made to a "valve" the term is to be understood in its broad sense as means for permitting or interrupting passage of the fluent contents of the receptacle, and not necessarily in the conventional sense of two separate mechanical parts functioning in an obturating manner and, where use is made of the noun "pinch" or the verb "to pinch" the same are intended to describe such manipulation of a tube of flexible or resilient material which is of generally shape-retaining character and which, when bent or folded upon itself to induce a collapsing of the wall, when bent or folded upon itself to induce a collapsing of the wall and closing of the bore thereof, will prevent flow of fluent material therethrough. In certain embodiments to be described the tube may be compound, i.e. a tube within a tube, so that joint pinching occurs, the inner tube, through which flow occurs, being effectively closed against flow by force exerted through the outer tube whereby the outer tube simply amplifies such closing. The bore of the outer tube is not necessarily a fluid passage.

Regarded broadly, the invention comprises a dispensing type closure, namely of a type which, when in an open position ("on") will permit dispensing of the fluent contents of a receptacle with which the closure is incorporated and which, when in closed position, will interrupt flow. As so characterized the device may be described alternatively as a combined valve and dispensing device. Desirably the device is molded of a plastic

composition, e.g. polyethylene, which is of a generally shape-retaining nature and is characterized by the property that it may be be flexed repeatedly, within the anticipated life of the device. To this end the cross sections which are subjected to repeated flexing are suitably dimensioned and proportioned and where certain parts require some rigidity they may be otherwise dimensioned and proportioned. Thus, the invention device is preferably molded in one piece.

Before proceeding with the broad outline of the principal features of the invention it is to be noted that such features are essentially distinct from that portion of the device by means of which the same is attached to, or incorporated with the receptacle. Accordingly, the invention closure may be fabricated for any type of attachment such as to a screw-threaded or beaded neck of a receptacle, for snap type engagement in an aperture in a wall of the receptacle, or for integration with the receptacle, e.g. a squeeze-type bottle such as by molding the base of the closure simultaneously therewith or, assuming the availability of a suitable cement, the base may be united with the receptacle by adhesion; or the desired union may be effected by fusion or other autogenous process.

The device is characterized *inter alia* by the provision of a base outwardly from which a resilient nozzle protrudes and which, when in a so-called normal or "on" position with the axis of the nozzle essentially straight, has its bore in fluid communication with the interior of the receptacle for dispensing and, when the nozzle is pinched by bending the same to position same outer portion of said axis at substantially 90° to the inner portion of said axis, the bore is closed, i.e. "off". In a preferred embodiment of the invention means are provided for accomplishing pinching in an effective manner whereby the nozzle, when "off", is subject to two principal forces, one applied substantially in the direction of the axis of the bent-over end of the nozzle and the other in a direction substantially normal to said axis. In practice it has been found that such forces are to be applied to provide a disposition of the respective axes of the portions of the nozzle extending away from each side of the line of pinch at an included angle of somewhat less than 90°, say in the range of from 40° to 50°. It is also preferred to dispose that portion of the nozzle intermediate the line of pinch and the junction of the nozzle with the base at an angle displaced from the vertical in a direction toward the pinch whereby the portions of the nozzle on each side of the pinch line are more readily caused to occupy the just-mentioned included angle. To accomplish that end means are provided for retaining the resilient nozzle in the desired displaced position and which means are particularly adapted for initial positioning of the nozzle by the use of automatic machinery following molding. In another aspect the invention provides releasable means for reliably retaining the free, i.e. bent over end of the nozzle in "off" position and, in a subsidiary aspect, to provide for closing the outer end of the nozzle bore to preclude entry of foreign matter which may clog the same and/or affect the fluent material deleteriously during periods of non-use. In still another aspect the invention contemplates a form of spout constituted as a "tube within a tube". Exteriorly the spout is reasonably rigid for use in pouring and has a flaccid tubular appendage therein joined by one end to the spout, the other end being open. Thus upon bending of the spout the appendage is pinched by the outer wall to terminate flow.

Turning now to Figs. 1 to 9 there is shown an exemplificative device embodying the principles of the invention comprising a body 10 having a hollow cylindrical lateral wall including a base 11 and a skirt 12 depending therefrom. For exactness of reference the base and skirt 12 are defined as lying above and below the plane X—X respectively. Such skirt is illustrated only to show one of several modes of attaching the device to a receptacle 13, e.g. by means of a screw-threaded connection to the neck thereof. The base 11 may also be provided with an inner bead 15 adapted to bear on the end of the neck of the receptacle 13 when it is desired to supplement the seal afforded by the screw-threaded connection referred to above. As previously pointed out, the means of attachment forms no part of the invention *per se* and therefore elaboration is deemed unnecessary; similarly with respect to the bead 15.

The body 10 including the base 11 and skirt 12 (or other attaching part) are comparatively rigid, i.e. shape-retaining except for those portions thereof which are to be deformed or flexed during molding, initial arrangement of the parts and subsequent function; and may be provided with any desired surface configuration whether for functional or aesthetic purposes. For example the top may be flat or slightly crowned to receive a price label or impression as is the custom in retail merchandising; and the exterior of the lateral surface may be knurled or fluted. At its center the base 11 is preferably recessed to define a generally cup-shaped portion or well 17 including a bottom annular wall 18. The wall 17 is so dimensioned and proportioned as to be comparatively shape-retaining, but yet take some moderate flexing as imparted by manipulation of the nozzle in a manner to be described subsequently and therefore to mitigate against rupture due to fatigue. Like considerations obtain with respect to the skirt 12 and bead 15 since the former may be desirably stretched slightly to

improve the screw-threaded fit, and the latter to yield to provide a seal.

Protruding upwardly from the bottom wall 18 is a flexible nozzle 22. In Fig. 2 is shown the nozzle as molded and, in Fig. 4 the broken lines indicate the same as molded and the full lines as it appears in "on" position. It will be understood that the junction of the nozzle 22 with the base 11 need not be at the bottom of a cup or well therein as illustrated and described exemplificatively, but that such junction may be directly on the upper face of the base. The embodiment of the example is preferred since, by dropping the basal portion of the nozzle below such upper face, the required useful length of nozzle may be provided with a lesser overall height of the device as a whole.

From a consideration of Figs. 2 and 4 and having regard to the broken lines, it will be observed that the device of the example is adapted to molding in one piece, there being no re-entrant angles, transverse projections or apertures of a character requiring retractable cores in the mold. Such re-entrant angles or transverse projections as may be required — and these are to be described subsequently — are so configured that the finished part may be stripped from the halves of the mold by momentary deformation of the piece part in the regions of such re-entrant angles or transverse projections.

As shown by the broken lines in Fig. 4 the distal end of the nozzle may be of the type termed "snip tip" in the trade and as indicated at 24. Such feature may be requested by customers to make doubly certain that the contents of the receptacle do not leak during shipment and other handling following filling, and prior to use by the consumer. However, rigorous testing has demonstrated that the seal effected by the nozzle in its closed position is completely reliable in itself. Although the device is preferably made commercially available in closed, i.e. "off" position, as in Fig. 1, a customer may prefer to ship his product with the nozzle unbent. In such case the "snip tip" 24 or other temporary closure is required.

To insure reliable operation, namely that the pinching of the nozzle will substantially occur uniformly along the same line of the bendable portion each time the nozzle is bent upon itself means are provided to render the medial portion of the nozzle between the tip portion and the body relatively flexible. This may be effected by weakening the wall of the nozzle in a predetermined region. To this end the nozzle wall is reduced in thickness in an area extending on each side of the bend line, e.g. as indicated in Fig. 4 at *A*. Such reduction in thickness of this portion of the nozzle length may be different from the proportions indicated. For further example, the nozzle may, in a region adjacent its junction with the wall 18, be simply thickened or may otherwise be made rigid, as by the provision of webs between the lateral wall of the wall 17 and the nozzle or by localized interior or exterior ribbing applied to the nozzle. That extent of the nozzle beyond the plane *B*, being comparatively rigid relative to the portion *A*, serves both as a "handle" for bending the nozzle and as part of the means for retaining the nozzle in "off" position, as will be detailed hereinafter.

A preferred mode of establishing the uniform, repetitive pinch line referred to in the preceding paragraph comprises a pair of mutually opposite projections or nubs 31 carried in any suitable manner on the base, as on the opposite interior faces 32 of a recess 33 (Figs. 6 and 9), of which the well 17 is a continuation. Figs. 3 and 6 show the nozzle in "off" position with the line of pinch governed by the nubs 31 in cooperation with the latching means to be described.

In order that the nozzle 22 may, upon initial positioning of the same following molding, be located behind, so to speak, the nubs 31, whereafter it remains during use of the closure a clearance space 41 is provided. This latter is a continuation of the recess 33 and is made large enough, to accommodate without interference, the offset of the nozzle below the plane *B* (Fig. 4). Such initial positioning of the nozzle is best accomplished by the use of a suitable thrusting instrumentality applied to the nozzle in the region and in the direction indicated by the arrow *C* (Fig. 2) whereby the nozzle may be forced past the nubs 31 to take up the position of Fig. 4. Such operation may be readily accomplished by automatic machinery. By reason of the offset imparted to the lower portion of the nozzle the same will assume a partially pinched condition. Since the nozzle is initially circular such partial pinching will transform the circular configuration theretofore existing into a more or less elliptical or flat sided oval configuration. The resulting widthwise increase in diameter (corresponding to the major axis of the new configuration) assures reliable engagement of this portion of the nozzle behind the nubs 31 and the consequent permanent retention thereof in such position. Stated otherwise, the user is then not obliged to re-locate the nozzle in optimum pinched or "off" position each time the closure is to be "off". It will be understood that the horizontal distance between the crest of the nubs 31 is less than the associated major axis of the nozzle in order that this latter be permanently retained thereby.

To actuate the device from the "on" position (Fig. 4) to the "off" position (Fig. 3) the distal end of the nozzle is rotated digitally substantially 90° for releasable engagement by latching or detent members 43-43 provided adjacent the outer end of the recess 32. Such members 43-43 are desiraby con-

formed as in Fig. 5, namely with chamfered or rounded entering surfaces 44 merged with outwardly inclined faces 45, jointly defining a throat sufficiently narrower than the active diameter of the nozzle to provide detent action. Thus the free end of the nozzle may be thrust into the space defined between the members 43 whereby the same is retained pending further actuation to "on". Such latter step is facilitated by the inclination of the faces 45-45. Entry of the finger tip under the nozzle for reverse actuation, i.e. release from the latching means, is provided by a concave depression in the base 11 about the free end of the nozzle (Figs. 3 and 5). Upon release the inherent resiliency of the material of which the nozzle is comprised will bias the same to "open" position (Fig. 4). Fig. 8 illustrates the nozzle disengaged from the latching means.

From Fig. 3 it will be noted that, in the preferred embodiment, the nubs 31 are so positioned in a transverse sense with respect to the axis *M—M* of the inner end of the nozzle and in a vertical sense with respect to said end and the detent members 43-43 as to provide an included angle at the pitch of substantially 45°. It has been determined that while a larger angle, say 90°, may provide reliable closure of the nozzle bore the smaller angle is preferred. However, if such angle is too sharp the hazard of cracking of the material at the pinch is presented. That is to say predetermination of the angle of pinch depends on the following factors: (1) the resistance of the material to failure following repeated bending, (2) the desired tightness of the pinch which may be less for the viscous and pulverulent fluent materials e.g. hand lotion and may be more for the relatively less viscous, e.g. naphtha, and (3) the resiliency of the material which, in the case of an included angle which is too sharp, will tend to release the nozzle from the latching means.

It will be apparent from Fig. 3 that when the nozzle is "off" it is subject to two principal forces, one, due to the reactive force of the nubs 31 acting substantially transversely to the axis of the nozzle which may be resolved into a vertical and a horizontal component and the other due to the retentive force of the latching means, which while having a principal direction which is principally vertical, may be resolved into horizontal and vertical components. Thus, the pinch is effected by the sums of such components applied, as described, in a predetermined manner by the inter-action of the parts described.

In the foregoing connection it is to be understood that the portions of the nozzle on either side of the pinch may be said to have distinct axes intersecting at the desired included angle. However, considering these axes in the light of the actual situation the said axes are joined by an arcuate axis portion.

Alternatively the nubs 31-31 may be dispensed with and the forces required to maintain the nozzle in "off" condition provided otherwise. For example, in Figs. 14 and 15 the distal end of the nozzle 22a is provided with a shoulder 51 adapted to bear against the inner face 52 of a projection 53 or equivalent portion of the base 11 while the reduced end 54 of the nozzle is snugly engaged in a slot 55 in the projection 53. If desired the slot 55 may take the form of the space defined by the cooperating members 43-43 (Fig. 8). In either case the friction of the abutted parts and the direction of the forces exerted on the stressed nozzle have been found adequate to maintain the position of Fig. 14. It will be apparent that, assuming the nozzle to be essentially vertical in its unlatched or "on" position the same may be actuated to "off" by applying suitable bending force digitally and engaging the parts in the manner shown in Fig. 14.

Experience has demonstrated that complete pinching off of the nozzle and therefore optimum interruption of flow may be realized by modifications in the wall of the nozzle, particularly in the region of pinching, i.e. over a region whereat the nozzle is deformed from its relaxed cross section ("on"), to the stressed cross section induced upon pinching ("off"). Thus, in Figs. 10 and 11 there is shown a nozzle 22b in which the wall *G* on one side thereof is thicker than on the opposite side *F*, the thicker wall being on the side where bending occurs. The arrow *D* indicates the direction of bending. In this form of nozzle the thinner side will, upon folding, stretch and draw itself into a wrapped relation with the thicker wall, whereby the bore of the nozzle may be more readily reconstituted into the straight line representing complete closure of the bore. Desirably the thinner wall extends over somewhat more than 180° of the periphery and is arranged to merge smoothly with the thicker wall since abrupt change in curvature is likely to give rise to fatigue failure. It will be understood that, although such variation in wall thickness is illustrated as extending over the whole length of the nozzle the function to be served thereby may be obtained by limiting the same to the region of pinching, as previously mentioned.

Another alternative yielding the result set forth in the preceding paragraph is shown in Figs. 12 and 13 wherein the nozzle 22c has an elliptical cross section with the major axis *N—N* representing the fold line. Such cross section may be a flat sided oval with similar advantages. The arrow *E* shows the direction of bending.

Alternative modes of assuring a reliable pinch are depicted in Figs. 16 to 18. In these examples the nozzle assumes a compound form in which a tubular appendage within the nozzle, when pinched, is relied upon for in-

terrupting flow. Thus, adverting to Fig. 16 the nozzle 101 comprises an outer or principal tubular member 102 which may be of any of the configurations described in connection with Figs. 4, 10 or 12 i.e. of variable or oval wall thickness in different regions longitudinally thereof or of variable wall thickness regarded in transverse cross section. Member 102 is incorporated with the base 103 in any of the several modes heretofore detailed in respect of Figs. 1 to 4, viz. in a manner such that flexure of the nozzle to accomplish the pinch is not inhibited.

Merged with the tubular member 102 adjacent the exit end thereof and within the same is an inner tubular appendage 108. Both member 102 and appendage 108 are, transversely regarded, homologous except that appendage 108 has a substantially thinner wall than the member 102. In point of fact the appendage 108 is desirably flaccid in order to yield readily under compressive forces applied by bending of the member 102. Thus upon such bending of the member 101 to the "off" condition (Fig. 17) the walls of the same, being comparatively more rigid than the appendage 108, will readily compress this latter to pinch the same closed and, as indicated at *H* (Fig. 17) interrupt flow through the bore 109 thereof. Stated otherwise, the member 102 function analogously to a vice. Any suitable latching means may be utilized to retain the member 101 in "off" position, e.g. a flexible finger 111 similar to the member 63 of Fig. 19 to be detailed hereinafter.

If desired the appendage 108 may be made of such length that the pinch imparted to the member 102 will, in turn, pinch the extreme end 112 of the appendage, as indicated at *J* (Fig. 17a).

In the embodiments of Figs. 16 and 17a, it will be apparent that molding of the nozzle, base and latch are possible without the use of retractable cores. The overahang of the latch member 111 need not protrude more than suffices to engage over the distal end of the nozzle 101 and, being short, is readily deformed during stripping of the piece part from the mold. It should be understood that means such as those shown and described in connection with figs 3 and 4 are adapted in connection with the embodiments shown in figs. 10—18 to make the lower part of the nozzle more rigid than the medial part.

It is sometimes desirable to provide the invention device in a form wherein entry of foreign matter into the exit end of the nozzle bore may be precluded. To this end the modifications of Figs. 19 to 24 are referred to. In Figs. 19 and 20 the nozzle 22d terminates in a flat end 61 juxtaposed, in sealing relation, with a congruent pad 62 provided on the interior face of a resilient latch 63. The latch has a projection 64 to engage over the nozzle to retain the latter in "off" position. The outer face of the projection is chamfered, as shown, to facilitate engagement. Disengagement is effected by digitally displacing the latch to permit the nozzle to assume "on" position by virtue of the bias inherent therein.

In the modification of Figs. 21 and 22 the faces 61 and 62 are replaced by a button or protuberance 65 adapted to intromit the bore of the nozzle 22e. Depending upon the biasing forces of the nozzle and latch 63 the projection 64 may be eliminated and the nozzle retained by the protuberance 65 acting as a detent.

The further form of Figs. 23 and 24 embodies a resilient latch 68 having a recess 69 receiving the end of the nozzle 22f as shown. Operation is believed to be evident from the description heretofore given in connection with Figs. 19 to 22.

The invention device may be adapted to dispensing of the fluid as a spray or as a mist. Turning to Figs. 25 and 26 the nozzle 25g is shown provided with an exit end in the form of a membrane 71 having perforations 72 of any convenient size and number for dispensing the fluid as a plurality of discrete streams when used with a squeeze type plastics receptacle or other container having means for applying pressure to the fluid contents. Alternatively the nozzle may terminate in a single pinhole bore and an air tube of a well-known type fitted within the closure for atomizing action. For adapting the latter the necessary modification may be readily made in the body 11, all in accordance with conventional practice in that regard.

From Fig. 2 it will be apparent that the invention device is completely adapted to molding in one piece. The only re-entrant portions are the nubs 31 and portions of the latching members 43. However these elements may be so arranged with respect to adjacent portions of the device that the same are readily deformed and/or displaced momentarily as the molded part is stripped from the halves of the mold.

WHAT WE CLAIM IS:—

1. A dispensing closure for a receptacle for fluid comprising a body, a resilient nozzle with a bore protruding from the body and having an inner end communicating with the receptacle and a tip for discharging the fluid, the nozzle being bendable at a medial portion to close the bore, means to render the inner end of the nozzle more rigid than the medial portion, and a releasable latch for maintaining the nozzle in a bent (off) position and permitting the nozzle to regain an open bore (on) position upon release from the latch, the construction of the closure being such as to ensure that upon repeated operation of the nozzle between "on" and "off" positions, substantially the same line of bending is preserved.

2. A dispensing closure as claimed in claim 1 in which the tip portion of the nozzle is strengthened against bending or collapse relative to said bendable portion of the nozzle.

3. A dispensing closure as claimed in claim 2 in which the bendable portion of the nozzle has a reduced wall thickness relative to the outer end portion.

4. A dispensing closure as claimed in claims 1, 2 or 3, in which the nozzle and releasable latch are positioned for maintaining the respective longitudinal axes of the parts of the nozzle on both sides of the bendable portion at a relative angle of less than 90°.

5. A dispensing closure as claimed in claim 4 in which the nozzle and releasable latch are positioned for maintaining said respective axes at a relative angle in the range of from 40° to 50°.

6. A dispensing closure as claimed in any of the preceding claims in which the wall thickness at the bendable portion is greater at the side facing toward the direction of bending than at the diametrically opposite side so that in bending the nozzle toward the latch the thinner wall tends to stretch.

7. A dispensing closure as claimed in any one of the preceding claims in which the body comprises a wall defined by a bottom wall and a lateral wall and a passage communicating with the bore of the nozzle which extends from the bottom wall in spaced relation to the lateral wall.

8. A dispensing closure as claimed in claim 7 in which strengthening means substantially coextensive with the lateral wall are provided between the lateral wall and the adjacent part of the nozzle.

9. A dispensing closure as claimed in claims 2 and 8 in which the strengthened part of the nozzle adjacent the lateral wall is weaker than the outer end portion of the nozzle.

10. A dispensing closure as claimed in any of the preceding claims in which the cross sectional thickness of the nozzle wall tapers from a minimum thickness at a transverse axis of the nozzle in the weak portion towards the respective nozzle ends.

11. A dispensing closure as claimed in claim 10 in which the respective nozzle end portions have tubular walls.

12. A dispensing closure as claimed in any of the preceding claims in which the bendable portion of the nozzle has an elliptical cross section and is adapted to bend across the major axis of the ellipse.

13. A dispensing closure as claimed in any of the preceding claims in which a tubular appendage with open ends is coaxially secured within the bore of the nozzle and extends to the bendable portion.

14. A dispensing closure as claimed in claim 13 in which the appendage is of material which is less shape retaining than that of the nozzle.

15. A dispensing closure as claimed in any of the preceding claims in which the releasable latch comprises a cover for the outer end of the nozzle.

16. A dispensing closure as claimed in claim 15 in which the cover comprises a sealing member for engaging the outer end of the nozzle.

17. A dispensing closure as claimed in any of the preceding claims in which the releasable latch comprises a detent member secured to the body.

18. A dispensing closure as claimed in claim 17 in which the detent member is resilient.

19. A dispensing closure as claimed in any of the preceding claims in which the body, nozzle and releasable latch are moulded in one piece.

20. A dispensing closure as claimed in any of the preceding claims having a nozzle of polyethylene.

21. A dispensing closure as claimed in claim 1 wherein the means for ensuring the repetition of the nozzle bending line comprise nubs projecting from the body and engaging the medial portion of the nozzle on its inwardly-bending side.

22. A dispensing closure for a receptacle for fluid substantially as described with reference to and as illustrated in the accompanying drawings.

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ublished at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

Fig. 1

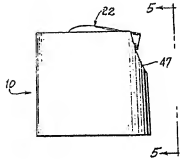


Fig. 2

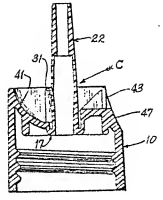
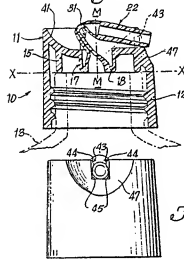


Fig. 3



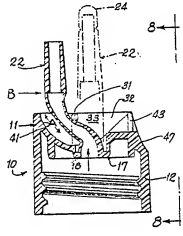


Fig. 4

Fig. 5

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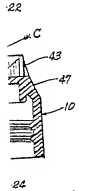
4 SHEETS This drawing is a reproduction of the Original on a reduced scale
Sheets 1 & 2

2



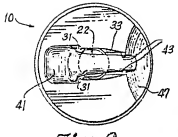
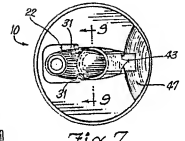


Fig. 6



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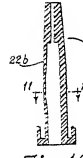

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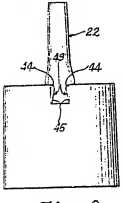

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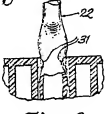

Fig. 9

Fig. 11

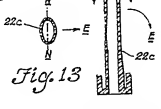

Fig. 13

Fig. 12

4

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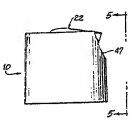
Fig. 1



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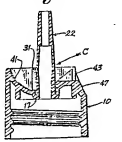

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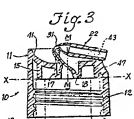

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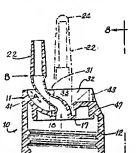


Fig. 5

Fig. 6

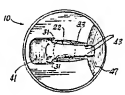
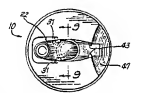


Fig. 7



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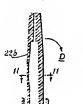

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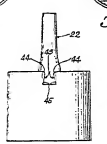


Fig. 9

Fig. 11

Fig. 13

Fig. 12

Fig. 19

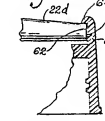


Fig. 20

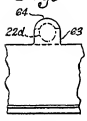


Fig. 21

Fig. 22

Fig. 23

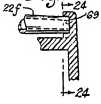


Fig. 24

Fig. 14

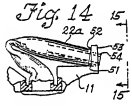


Fig. 15

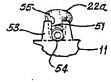
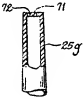


Fig. 26

Fig. 25



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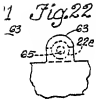

1 Fig. 22

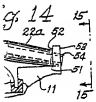

Fig. 14

Fig. 15

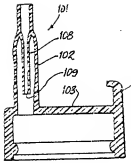

Fig. 16

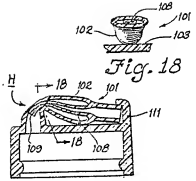

Fig. 17

Fig. 18

Fig. 17a

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